

1. A coaxial polishing-dressing apparatus of a semiconductor wafer by a chemical-mechanical polishing method comprising:

a polishing platen having an upper surface on which a polishing pad is affixed, said polishing platen being rotated in one direction along a central axis thereof;

a plurality of coaxial polishing-dressing head assemblies each having a lower nesting surface opposed to an upper surface of the polishing pad on said polishing platen, said nesting means releasably holding a wafer to be polished, said coaxial assembly means rotating along a central axis thereof and pressing the semiconductor wafers on a radial portion of said rotating polishing pad;

annular dressing rings for dressing said polishing pad are positioned coaxially encircling each nested wafer, said annular dressing rings are removably attached to said lower surface of said plurality of wafer nesting support heads; and

compressing means for applying a polishing and dressing pressure to said coaxial polishing-dressing head assemblies, whereby the wafer and dressing ring on the lower surface of said coaxial polishing-dressing head assemblies are pressed against the upper surface of the polishing pad.

2. The apparatus according to claim 1 wherein coaxially combining said dressing ring with said wafer, simultaneously polishes said wafer and dresses said polishing pad.

3. The apparatus according to claim 1 wherein said polishing pad is treated with a suitable polishing slurry for polishing said semiconductor wafer.

30 4. The apparatus according to claim 1 wherein said annular dressing ring comprises an annular support member on which a suitable dressing material is bonded.

35 5. The apparatus according to claim 4 wherein said annular dressing ring substrate is made of a ceramic.

6. The apparatus according to claim 4 wherein said annular dressing ring ceramic substrate includes a glass frit binder.

40 7. The apparatus according to claim 4 wherein said annular dressing ring ceramic substrate has inclusions of sintered diamond abrasives..

8. The apparatus according to claim 1 wherein coaxially combining said annular dressing ring on said coaxial polishing-dressing head assembly on a CMP machine eliminates the need of a separate dressing station.

45 9. The apparatus according to claim 8 wherein eliminating the need of a head stations for increasing machine throughput.

50 10. The apparatus according to claim 1 wherein coaxially combining said annular dressing ring improves polishing uniformity and process stability.

55 11. The apparatus according to claim 1 wherein coaxially combining said annular dressing ring with said wafer supporting head simplifies the structure of the machine while improving maintainability.

12. A chemical mechanical polishing method for forming a planar and uniform surface on a semiconductor substrate, said method comprising the steps of:

60 providing a rotatable platen having a top surface with a polishing pad mounted thereon;
preparing said polishing pad with a polishing compound;
providing a plurality of coaxial polishing-dressing head assemblies each having a lower surface opposed to an upper surface of the polishing pad
65 on said polishing platen, said nesting means releasably holding a wafer to be polished, said nesting means rotating along a central axis thereof and pressing the semiconductor wafers on a radial portion of said rotating polishing pad;
providing annular dressing rings for dressing said polishing pad are, said
70 annular dressing rings are positioned coaxially encircling each nested wafer;
providing compressing means for applying a polishing and dressing pressure to said coaxial polishing-dressing head assemblies, whereby the wafer and dressing ring on the lower surface of said coaxial
75 polishing-dressing head assemblies are pressed against the upper surface of the polishing pad.

13. The method according to claim 12 wherein coaxially combining said dressing ring with said wafer, simultaneously polishes said wafer and dresses said
80 polishing pad.

14. The method according to claim 12 wherein said annular dressing ring comprises an annular support member on which a suitable dressing material is bonded.

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15. The method according to claim 12 wherein said annular dressing ring substrate is made of a ceramic.

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16. The method according to claim 12 wherein said annular dressing ring ceramic substrate includes a glass frit binder.

17. The method according to claim 12 wherein said annular dressing ring ceramic substrate has inclusions of sintered diamond abrasives..

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18. The method according to claim 12 wherein coaxially combining said annular dressing ring on said coaxial polishing-dressing head assemblies on a CMP machine eliminates the need of a separate dressing station.

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19. The method according to claim 12 wherein eliminating the need of a separate dressing station saves machine space allowing additional nesting support head stations for increasing machine throughput.

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20. The method according to claim 12 wherein coaxially combining said annular dressing ring improves polishing uniformity and process stability.

21. The method according to claim 12 wherein coaxially combining said annular dressing ring with said wafer polishing head simplifies the structure of the machine while improving maintainability.